

Serial No. 09/973,757

Attorney Docket No. VX012372

LISTING OF CLAIMS:

1. (Currently amended) A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, comprising:

a plurality of work machines, wherein said plurality of work machines is being connected by a first communication means so as to make configured to facilitate reciprocal communications possible;

a server apparatus; wherein at least one or a plurality of main work machines machine out of said plurality of work machines is connected to the, and a server apparatus are connected by a second communication means so as to make configured to facilitate reciprocal communications possible;

wherein each of said plurality of work machines is provided with work machine information detection means for detecting work machine information;

a database for storing data for managing said plurality of work machines, and management information production means for producing management information based on said work machine information and on said data stored in said database, are provided at said server apparatus end;

in conjunction with work progress of said plurality of work machines, said work machine information is detected by said work machine information detection means provided in said plurality of work machines, and the work machine information so detected is transmitted to said at least one main work machine or machines through said first communication means;

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said at least one main work machine ~~or machines transmit~~transmits said transmitted work machine information to said server apparatus through said second communication means;

said server apparatus produces said management information based on said transmitted work machine information and on said data stored in said database, and transmits the management information so produced to said at least one main work machine ~~or machines~~ through said second communication means; and

said at least one main work machine ~~or machines manage~~transmits work instructions to other work machines of said plurality of work machines through said first communication means, based on said transmitted management information.

2. (Currently amended) The work machine management system according to claim 1, wherein said at least one main work machine includes a display device, and wherein said management information transmitted from said server apparatus to said at least one main work machine ~~or machines~~ is displayed on ~~a~~the display device ~~provided in said main work machine or machines.~~

3. (Currently amended) The work machine management system according to ~~claim 1~~claim 1, wherein said prescribed work ~~consists of~~comprises a plurality of work processes; and said at least one main work machine is determined for each of those work processes.

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4. (Currently amended) The work machine management system according to claim 1, wherein said management information produced by said server apparatus and transmitted to said at least one main work machine ~~or machines~~ is information relating to maintenance that should be performed on any of said plurality of work machines.

5. (Currently amended) The work machine management system according to claim 1, wherein said management information produced by said server apparatus and transmitted to said at least one main work machine ~~or machines~~ is information relating to a trouble that has occurred in any of said plurality of work machines.

6. (Currently amended) A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines in accordance with a scheduled work plan, comprising:

a plurality of work machines, wherein said plurality of work machines is being connected by a first communication means so as to make configured to facilitate reciprocal communications possible;

a server apparatus; wherein at least one or a plurality of main work machines-machine out of said plurality of work machines is connected to the, and a server apparatus server apparatus are connected by a second communication means so as to make configured to facilitate reciprocal communications possible;

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wherein each of said plurality of work machines is provided with work machine information detection means for detecting work machine information;

a database for storing data for managing said plurality of work machines, and scheduled work plan production means for producing a scheduled work plan based on said work machine information and on said data stored in said database, ~~are~~ provided at said server apparatus end;

in conjunction with work progress of said plurality of work machines, said work machine information is detected by said work machine information detection means provided in said plurality of work machines, and the work machine information so detected is transmitted to said at least one main work machine or machines through said first communication means;

said at least one main work machine ~~or machines transmit~~ transmits said transmitted work machine information to said server apparatus through said second communication means;

said server apparatus produces a scheduled work plan, based on said transmitted work machine information and on said data stored in said database, and transmits that scheduled work plan so produced to said at least one main work machine ~~or machines~~ through said second communication means; and

said at least one main work machine ~~or machines manage~~ transmits said work instructions to other work machines of said plurality of work machines through said first communication means, based on said transmitted scheduled work plan.

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7. (Currently amended) The work machine management system according to claim 6, wherein said at least one main work machine includes a display device, and wherein said scheduled work plan transmitted from said server apparatus to said at least one main work machine or machines is displayed on a the display device provided in said main work machine or machines.

8. (Currently amended) The work machine management system according to claim 6, wherein said scheduled work plan comprises a plurality of work processes; and said at least one main work machine is determined for each of those work processes.

9. (Currently amended) The work machine management system according to claim 6, wherein said server apparatus transmits information relating to maintenance that should be done to any of said plurality of work machines, and said server apparatus transmits a revised scheduled work plan produced by revising current the scheduled work plan in conjunction with the performance of maintenance, to said at least one main work machine or machines.

10. (Currently amended) The work machine management system according to claim 6, wherein further comprising

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a terminal apparatus provided on ~~the~~an end where maintenance is done on said plurality of work machines, said terminal apparatus being-is also connected to said second communication means;

wherein said server apparatus transmits information relating to maintenance that should be done to any of said plurality of work machines, and transmits a revised scheduled work plan produced by revising ~~current~~the scheduled work plan in conjunction with the performance of maintenance, to said at least one main work machine ~~or machines; and~~

wherein said at least one main work machine ~~or machines~~ transmit transmits instructions for performing maintenance, based on the transmitted information relating to maintenance, to said ~~maintenance~~ terminal apparatus through said second communication means, and ~~manage~~ transmits work instructions to other work machines of said plurality of work machines through said first communication means based on said revised scheduled work plan.

11. (Currently amended) The work machine management system according to claim 6, wherein said server apparatus transmits information relating to ~~troubles~~ trouble that ~~have~~has arisen in said plurality of work machines, and a revised scheduled work plan produced by revising ~~current~~the scheduled work plan ~~in conjunction with occurrence of troubles~~ responsive to the trouble, to said at least one main work machine ~~or machines~~.

12. (Currently amended) The work machine management system according to claim 6, ~~wherein~~ further comprising

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a trouble correction terminal apparatus provided on the end where ~~troubles~~ trouble with said plurality of work machines ~~are~~ is corrected, ~~is~~ also the trouble correction terminal being connected to said second communication means;

wherein said server apparatus transmits information relating to ~~troubles~~ the trouble and a revised scheduled work plan produced by revising ~~current the~~ the scheduled work plan in ~~conjunction with responsive to the trouble occurrence;~~ to said at least one main work machine ~~or machines;~~ and

wherein said at least one main work machine ~~or machines~~ transmits instructions for correcting ~~troubles~~ the trouble, based on information relating to the trouble ~~troubles that was transmitted,~~ to said trouble correction terminal apparatus through said second communication means, and ~~manage~~ transmits work instructions to other work machines of said plurality of work machines through said first communication means in accordance with said revised scheduled work plan.

13. (Currently amended) The work machine management system according to claim 6, wherein said server apparatus stores in memory a schedule and performance results data indicating a relationship between a scheduled work plan previously produced ~~in past and~~ an actual work performance ~~results~~ result as performed ~~on basis of~~ in accordance with said scheduled work plan, and said server apparatus produces a new scheduled

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work plan ~~based on~~ responsive to said schedule and said performance results data.

14. (Currently amended) A scheduled work plan production apparatus that, in cases where a scheduled work plan is produced according to work request data indicating particulars of work requested by an ordering party, and work is caused to be done, using a plurality of work machines, based on said produced scheduled work plan, produces said scheduled work plan, comprising:

a plurality of work machines; wherein

a server apparatus;

a database for storing schedule and performance results data indicating a relationship between said a scheduled work plan previously produced in past and an actual work performance results result as performed on basis of said a scheduled work plan, the data base being is provided at said server apparatus end;

a terminal apparatus on an end of an said ordering party ~~end;~~;

wherein said server apparatus, and said plurality of work machines are connected by a communication means so as to make configured to facilitate reciprocal communications possible;

wherein said work request data are input from said terminal apparatus on said ordering party end;

wherein said server apparatus produces a scheduled work plan based on input work request data and on a schedule and performance results data

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stored in said database, and said server apparatus transmits said ~~produced~~ scheduled work plan to said plurality of work machines through said communication means, and updates said schedule and performance results data in said database;

said plurality of work machines ~~performs-performing~~ work based on said transmitted scheduled work plan transmitted from said server apparatus, and said plurality of work machines ~~transmits-transmitting~~ actual work performance ~~results-result~~ as performed on a basis of said scheduled work plan to said server apparatus through said communication means; and

wherein said server apparatus updates said database with said actual work performance ~~results-transmitted~~ result.

15. (Currently amended) The scheduled work plan production apparatus according to claim 14, wherein

when revision data for revising ~~a-current~~ scheduled work plan are givenprovided, said server apparatus revises ~~current-the~~ scheduled work plan based on those revision data, said work request data, and said schedule and said performance results data ~~stored in said database to produce a revised~~ scheduled work plan, and said server apparatus transmits said revised scheduled work plan to said plurality of work machines through said communication means; and

said plurality of work machines ~~performs-performing~~ work based on the transmitted-revised scheduled work plan, and said plurality of work machines ~~transmits-transmitting the~~ actual work performance results ~~as performed on a~~

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basis of said scheduled work plan to said server apparatus by said communication means.

16. (Currently amended) A scheduled work plan production apparatus that, in cases where a scheduled work plan is produced according to work request data indicating particulars of work requested by an ordering party, a plurality of work machines is obtained, and work is caused to be done using said plurality of work machines so obtained, based on said produced scheduled work plan, produces said scheduled work plan, comprising: wherein

a server;

a database for storing a schedule and performance results data indicating a relationship between a scheduled work plan previously produced ~~in-past~~ and actual work performance results as performed on basis of said scheduled work plan, ~~is provided at the~~ server apparatus end;

a rental/production end terminal apparatus for renting or producing said work machines ~~is also provided~~, said rental/production end terminal apparatus being provided on the ends where rental/production is performed;

a terminal apparatus on said ordering party end,

wherein said terminal apparatus, said server apparatus, said plurality of work machines, and said rental/production end terminal apparatus are connected by a communication means so as to make configured to facilitate reciprocal communications possible;

wherein said work request data are input from said terminal apparatus ~~on said ordering party end to said server apparatus;~~

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wherein said server apparatus ~~produces~~ is configured to facilitate producing a scheduled work plan based on responsive to the input work request data and on to the schedule and the performance results data stored in said database, transmits, transmitting said ~~produced~~ scheduled work plan to said plurality of work machines and to said rental/production end terminal apparatus through said communication means, and ~~updates~~ updating the schedule and the performance results data in said database;

said plurality of work machines ~~performs~~ performing work based on ~~transmitted the~~ scheduled work plan from said server apparatus, and transmits-transmitting actual work performance results as performed on basis of said scheduled work plan to said server apparatus by said communication means;

wherein said server apparatus updates said database with the actual work performance results ~~transmitted~~; and

wherein said rental/production end terminal apparatus plans rental or production based on said ~~transmitted~~ scheduled work plan from said server apparatus.

17. (Currently amended) The work machine management system according to claim 1, ~~wherein~~ further comprising

an information display for displaying information ~~toward~~ outside of a work site where said plurality of work machines ~~is~~ are operating is provided in one or more of said plurality of work machines;

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wherein said server apparatus produces information relating to said work site, based on the work machine information ~~transmitted~~ and on the data stored in said database, and transmits said information relating to said work site ~~so produced~~ to said main work machine through said second communication means; and

said main work machine displays said information relating to said work site ~~so transmitted~~ on said information display.

18. (Original) The work machine management system according to claim 17,

wherein

said information display is deployed on a work machine other than said main work machine; and

said main work machine transmits transmitted information relating to said work site to another work machine through said first communication means and causes said information to be displayed on said information display deployed on said other work machine.

19. (Currently amended) The work machine management system according to claim 1,

~~wherein~~ further comprising

an information display for displaying information ~~toward~~ outside of a work site where said plurality of work machines ~~is~~ are operating, ~~is~~ installed in the periphery of said work site;

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wherein said server apparatus produces information relating to said work site, based on said work machine information ~~that has been transmitted and~~ on the data stored in said database, and transmits said information relating to said work site ~~so produced~~ to said main work machine through said second communication means; and

wherein said main work machine displays said information relating to said work site ~~so transmitted~~ on said information display.

20. (Currently amended) The work machine management system according to claim 19, wherein said main work machine causes ~~transmitted the~~ information relating to said work site to be displayed on said information display installed in the periphery of said work site via said first communication means.

21. (Currently amended) The work machine management system according to claim 1, ~~wherein~~ further comprising

an information display for displaying information ~~toward outside of a~~ work site where said plurality of work machines ~~is~~ are operating, ~~is~~ installed in the periphery of said work site; and

wherein said server apparatus produces information relating to said work site, based on work machine information that has been transmitted and on said data stored in said database, transmits said information relating to said work site ~~so produced~~ to said information display through said second

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communication means, and causes said information relating to said work site ~~so transmitted~~ to be displayed on said information display.

22. (Currently amended) A work machine management system of work machines that perform prescribed work by operation of a plurality of work machines inside a work site, comprising:

environmental condition measurement means for measuring environmental conditions in ~~the~~ periphery of a work site, provided in the periphery of said work site, where the environmental conditions include noise levels and toxic chemical concentrations;

and at least one information display ~~or displays~~ for displaying information ~~toward~~ outside of a work site, at least one of installed in the periphery of said work site, ~~or, alternatively,~~ and provided in one or more of said plurality of work machines;

communication means for connecting said environmental condition measurement means with a server apparatus and connecting said server apparatus with said at least one information display ~~or displays~~, ~~so as to make~~ configured to facilitate reciprocal communication ~~possible~~; and

display information production means, provided at ~~said~~ server apparatus ~~end site~~, for producing environmental condition display information based on measured environmental condition values and on data stored in a database; wherein

said measured environmental condition values are measured by said environmental condition measurement means, in conjunction with work

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progress of said plurality of work machines, and are transmitted from said environmental condition measurement means to said server apparatus through said communication means; and

said server apparatus produces environmental condition display information, based on measured environmental condition values ~~so transmitted~~ and on data stored in said database, said server apparatus transmits said environmental condition display information ~~so produced~~ to said information display through said communication means, and said server apparatus causes said environmental condition display information ~~so transmitted~~ to be displayed on said information display.

23. (Currently amended) The work machine management system according to claim 1, wherein data on performance results for work performed by said plurality of work machines are stored in said database in said server apparatus for each of said plurality of work machines, and

when data requesting production of a work report relating to a specific work machine are transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out work performance results data corresponding to said specific work machine from data recorded in said database, said server apparatus produces a work report indicating particulars of work performed in a certain time period by said specific work machine, and said server apparatus transmits said work report so produced to said main work machine by said second communication

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means, and said main work machine manages said plurality of work machines based on said work report ~~so transmitted~~.

24. (Currently amended) The work machine management system according to claim 23, wherein

a terminal apparatus for labor management is provided on the end where labor management is performed for persons on board said plurality of construction machines, and

wherein said main work machine are connected by communication means ~~to make configured to facilitate reciprocal communications possible~~;

wherein said main work machine transmits said work report to said terminal apparatus for labor management by said communication means; and

wherein said terminal apparatus for labor management performs labor management for those on board said plurality of construction machines based on said work report so transmitted.

25. (Currently amended) The work machine management system according to claim 1, wherein

said work machine information is work condition information indicating actual work conditions of a work machine;

data on schedule of work to be performed by said plurality of work machines are stored in a database in said server apparatus, for each of said plurality of work machines;

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wherein, when said work condition information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out said work schedule data from data stored in said database, compares ~~these~~ said work schedule data and said ~~transmitted~~ work condition information, and, when there is a discrepancy, produces anomaly information indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information ~~so produced~~ to said main work machine through said second communication means; and

wherein said main work machine manages said plurality of work machines based on said transmitted anomaly information.

26. (Currently amended) The work machine management system according to claim 1, wherein

said work machine information ~~is~~ includes position information indicating an actual position of a work machine;

~~operating positions at~~ position data reflecting operating positions at which said plurality of work machines ~~operates~~ operate are stored in ~~a~~ the database ~~in said server apparatus;~~

wherein, when said position information is transmitted from said main work machine to said server apparatus through said second communication means,

wherein, when said work condition information is transmitted from said main work machine to said server apparatus through said second

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communication means, said server apparatus reads out said operating position data from said data stored in said database, compares ~~thesesaid~~ said operating position data and ~~transmittedsaid~~ said position information, and, when an ~~actual~~ the position information deviates from an ~~the~~ operating position data, produces anomaly information indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information so produced to said main work machine by said second communication means; and

wherein said main work machine manages said plurality of work machines based on said transmitted anomaly information.

27. (Currently amended) The work machine management system according to claim 1, wherein

said work machine information ~~is~~ includes attitude information indicating an actual attitude of a work machine;

attitude limit values for said plurality of work machines are stored in ~~at~~ the database in said server apparatus;

wherein when said attitude information is transmitted from said main work machine to said server apparatus through said second communication means,

said server apparatus reads out said attitude limit ~~value~~ data ~~values~~ from said data stored in said database, compares ~~thesesaid~~ said attitude limit ~~value~~ data ~~values~~ and ~~transmittedsaid~~ said attitude information, and, when an ~~actual~~ the attitude information exceeds an ~~the~~ attitude limit value ~~values~~, produces

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anomaly information indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information ~~so produced to~~ said main work machine through said second communication means; and
wherein said main work machine manages said plurality of work machines based on said transmitted anomaly information.

28. (Currently amended) The work machine management system according to claim 25, wherein

an anomaly handling terminal apparatus is provided on the end where anomaly handling is performed for a construction machine wherein an anomaly has occurred, and

said anomaly handling terminal apparatus and said server apparatus are connected by a third communication means to make configured to facilitate reciprocal communications possible;

wherein said server apparatus, when anomaly information has been produced by ~~said server apparatus~~, transmits said anomaly information to said anomaly handling terminal apparatus through said third communication means; and

wherein said anomaly handling terminal apparatus performs anomaly handling for said construction machine at which said anomaly occurred, based on said ~~transmitted~~ anomaly information.

29. (Currently amended) The work machine management system according to claim 25, wherein

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an anomaly handling terminal apparatus is provided on the end where anomaly handling is performed for a construction machine at which an anomaly has occurred, and wherein said anomaly handling terminal apparatus and said main work machine are connected by a third communication means to make configured to facilitate reciprocal communications possible;

wherein said main work machine transmits said anomaly information to said anomaly handling terminal apparatus through said third communication means; and

wherein said anomaly handling terminal apparatus performs anomaly handling for said construction machine at which said anomaly occurred, based on said ~~transmitted~~ anomaly information.

30. (Currently amended) A management system for work machines that perform prescribed work by operation of a plurality of work machines, ~~wherein~~ comprising:

a plurality of work machines; said plurality of work machines is being connected by a first communication means so as to make configured to facilitate reciprocal communications possible;

a server apparatus, wherein at least one or a plurality of main working machines out machine of said plurality of work machines are is connected to at the server apparatus by a second communication means so as to make configured to facilitate reciprocal communications possible;

work machine information detection means for detecting work machine information ~~are~~ provided in each of said plurality of work machines;

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a database for storing data for managing said plurality of work machines, and management information production means for producing management information based on said work machine information and on said data stored in said database, ~~are~~ provided at said server apparatus end;

in conjunction with work progress of said plurality of work machines, said work machine information is detected by said work machine information detection means ~~provided in said plurality of work machines~~, and said work machine information so detected is transmitted to said at least one main work machine ~~or machines~~ through said first communication means;

said at least one main work machine ~~or machines~~ ~~transmit~~ transmits said transmitted work machine information to said server apparatus through said second communication means;

said server apparatus produces said management information based on said transmitted work machine information and on said data stored in said database, and transmits said management information ~~so produced~~ to said at least one main work machine ~~or machines~~ through said second communication means;

said at least one main work machine ~~or machines~~ ~~manage~~ transmits work instructions to other work machines of said plurality of work machines through said first communication means, based on said transmitted management information; and

judgment means, ~~are~~ provided in said main work machine, for judging whether communications are possible or impossible by said second

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communication means between said main work machine and said server apparatus; and

wherein, when it is judged by said judgment means that communications by said second communication means are impossible, first latest management information received by said main work machine via said second communication means and second latest work machine information received by said main work machine via said first communication means are stored in said memory by said main work machine until it is judged by said judgment means that communications by said second communication means have become possible.

31. (Currently amended) A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, comprising:

a processor;

a plurality of work machines, ~~wherein~~ said plurality of work machines is being connected by a first communication means ~~so as to make~~ configured to facilitate reciprocal communications ~~possible~~;

at least one ~~one or a plurality of main working machines out work machine~~ of said plurality of work machines ~~are~~ is connected to said ~~management system~~ to said processor by a second communication means ~~so as to make~~ configured to facilitate reciprocal communications ~~possible~~;

work machine information detection means for detecting work machine information, are provided in each of said plurality of work machines;

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a database for storing managing data, ~~is provided at said management system end~~ for managing said plurality of work machines, and management information production software for producing management information based on said managing data and said work machine information, operably connected to said processor;

said processor is configured to facilitate said management system, when said at least one main work machine is determined, transmitting-transmits said managing data stored in said database and said management information production software to said main work machine through said second communication means;

wherein, in conjunction with work progress of said plurality of work machines, said work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information ~~so detected~~ is transmitted to said main work machine through said first communication means;

wherein said main work machine produces said management information, based on work machine information transmitted from said plurality of work machines through said first communication means, and on managing data and management information production software transmitted from said management system through said second communication means, said main work machine manages said plurality of work machines by transmitting said management information to other work machines of said plurality of work machines in accordance with said first communication means, based on said management information ~~so produced~~, said main work machine

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updates said managing data, and said main work machine transmits said managing data so updated to said management system, by said second communication means, every time a certain time period elapses; and
said ~~management system~~processor updates content stored in said database using ~~these~~ said ~~transmitted~~ managing data.

32. (Currently amended) A work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein comprising:

a processor;

a plurality of work machines, wherein said plurality of work machines is connected by a first communication means ~~so as to make configured to facilitate reciprocal communications possible;~~

~~one or a plurality of at least one main working work machine machines~~ out of said plurality of work machines ~~are~~ is connected to the ~~management system processor~~ by a second communication means ~~so as to make configured to facilitate reciprocal communications possible;~~

work machine information detection means for detecting work machine information, ~~are~~ provided in each of said plurality of work machines;

a database for storing managing data for managing said plurality of work machines, and management information production software for producing management information based on said managing data and said work machine information, ~~is provided at said processor management system end;~~

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wherein when said at least one main work machine is determined, said managing data stored in said database and said management information production software are written to said at least one main work machine;

wherein, in conjunction with work progress of said plurality of work machines, said work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information so detected is transmitted to said at least one main work machine through said first communication means;

wherein said at least one main work machine produces said management information, based on work machine information transmitted from said plurality of work machines to said at least one main work machine in accordance with by said first communication means, and on said managing data and management information production software ~~that were written~~, said at least one main work machine manages said plurality of work machines by transmitting said management information to other work machines of said plurality of work machines in accordance with said first communication means, based on said management information so produced, and said at least one main work machine updates said managing data; and

content stored in database in said ~~management system~~ processor is updated by the at least one main work machine writing said updated managing data in accordance with said second communication means to said processor ~~management system~~.

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